This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A method of rapid identification of characteristics of a transmission media channel, comprising:

generating a training signal sequence ~~signal~~ including T signal elements;

transmitting the training signal sequence as an input to the channel;

obtaining ~~an~~ a k element output signal sequence of the channel ~~related to~~ represented by convolution of the transmitted training signal sequence and an unknown N element impulse response of the channel for values of k=0 to k= T-(N-1);

computing a reference value from the training signal sequence; and

using the reference value to operate on the output signal sequence for decoupling the training signal sequence from the output signal sequence for computing an estimate of the impulse response of the channel.

2. (previously presented) The method of claim 1, further comprising using the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

3. (previously presented) The method of claim 1, wherein the computing the estimate of the impulse response of the channel comprises a convergence technique.

4. (previously presented) The method of claim 1, wherein the training signal sequence comprises a known training signal sequence.

5. (previously presented) The method of claim 1, wherein the computing the estimated impulse response of the channel comprises computing an initial estimate of the impulse response.

6. (previously presented) The method of claim 1, further comprising fine-tuning the estimated impulse response using convergence techniques.

7. (cancelled)

8. (previously presented) The method of claim 1, wherein the reference value is computed off-line.

9. (currently amended) The method of claim 1, wherein the reference value comprises a matrix ~~$M = (XX)^{-1} X$~~, $M = (\bar{X}X)^{-1} \bar{X}$, where X is the training signal sequence in matrix form, and $\bar{X}$ is the Hermitian of X.

10. (original) The method of claim 1, wherein the computing the estimate of the impulse response of the channel is hardware implemented.

11. (original) The method of claim 1, wherein the computing the estimate of the impulse response of the channel is software implemented.

12. (previously presented) The method of claim 1, further comprising using the estimate of the impulse response of the channel for removing echoes from signals received from the channel.

13. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of a filter.

14. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of an echo canceller.

15. (original) The method of claim 1, further comprising using the estimate of the impulse response of the channel for setting the coefficients of an equalizer.

16. (currently amended) A method of rapid identification of characteristics of a transmission media channel, comprising:

generating a training signal sequence;

transmitting the training signal sequence over ~~a~~ the transmission media channel to generate an observed or measured output signal;

using a minimized difference value between (a) the observed or measured output signal and (b) a signal value representation of convolution of the training signal sequence and the unknown impulse response of the channel, to derive a reference value related to the known training signal sequence that can be expressed as a matrix $M = (\bar{X}X)^{-1}\bar{X}$, where X is the training signal sequence in matrix form, and $\bar{X}$ is the Hermitian of X, ~~together with the training signal sequence and the observed or measured output signal for computing an estimated impulse response of the channel.~~

17. (cancelled)

18. (original) The method of claim 17, further comprising computing M off-line from communications with the transmission media channel.

19. (currently amended) The method of claim 16, ~~wherein the using the minimized difference, the training signal sequence, and the observed or measured output signal to compute the estimated impulse response of the channel comprises~~ further comprising using the reference value to operate on the observed or measured output signal for decoupling the training signal sequence from the observed or measured output signal for computing the estimated impulse response of the channel.

20. (previously presented) The method of claim 16, further comprising using the estimated impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

21. (previously presented) The method of claim 16, further comprising fine-tuning the estimated impulse response of the channel using convergence techniques.

22. (previously presented) The method of claim 16, wherein the computing the estimated impulse response of the channel comprises a convergence technique.

23. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of a filter.

24. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of an echo canceller.

25. (original) The method of claim 16, further comprising using the estimated impulse response of the channel for setting the coefficients of an equalizer.

26. (currently amended) A system for rapid identification of characteristics of a transmission media channel, comprising:

a transmission media channel;

a processor coupled to the transmission media channel, said processor adapted to execute code to:

generate a training signal sequence;

transmit the training signal sequence as an input to the transmission media channel;

obtain an output signal of the transmission media channel related to the transmitted training signal sequence and an unknown impulse response of the transmission media channel;

compute a reference value from the training signal sequence by executing code to compute a matrix $M = (\bar{X}X)^{-1}\bar{X}$ representing the reference value, off-line from the transmission media channel, and wherein X is the training signal sequence in matrix form, and $\bar{X}$ is the Hermitian of X; and

decouple the training signal sequence from the output signal to compute an estimate of the impulse response of the transmission media channel.

27. (original) The system of claim 26, wherein the processor comprises a DSP.

28. (original) The system of claim 26, wherein the processor comprises a CPU of a computer.

29. (original) The system of claim 26, further comprising a modem coupling the processor to the transmission media channel.

30. (original) The system of claim 26, wherein the processor forms part of a communications system.

31. (currently amended) The system of claim 26, wherein the processor forms part of a modem.

32. (original) The system of claim 26, further comprising a hybrid coupling the processor to the transmission media channel.

33. (cancelled)

34. (original) The system of claim 26, further comprising a hybrid coupling the processor to the transmission media channel.

35. (previously presented) The system of claim 26, wherein the processor is adapted to use the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

36. (previously presented) The system of claim 26, further comprising a filter adapted to remove channel impairments from signals received from the channel using the estimate of the impulse response of the channel.

37. (previously presented) The system of claim 36, wherein the filter comprises an echo canceller for removing echo signals.

38. (previously presented) , The system of claim 36, wherein the filter comprises an equalizer whose output is equalized for gain and phase.

39. (currently amended) A system for rapid identification of characteristics of a transmission media channel, comprising:

a processor for executing code for generating a training signal sequence, the training signal sequence transmitted as an input to the channel;

a communications system coupling the processor to the transmission media channel, the processor executing the code to:

obtain an observed or measured output signal of the transmission media channel related to the transmitted training signal sequence and an unknown impulse response of the transmission media channel,

compute ~~a reference value~~ from the training sequence, a reference value matrix $M = (\bar{X}X)^{-1}\bar{X}$, off-line from the transmission media channel, wherein X is the known training signal sequence, and $\bar{X}$ is the Hermitian of X

decouple the training signal sequence from the output signal, and

compute an estimate of the impulse response of the transmission media channel; and

a disk storage medium for providing the code to the processor.

40. (original) The system of claim 39, wherein the processor comprises a DSP.

41. (original) The system of claim 39, wherein the processor comprises a CPU of a computer.

42. (original) The system of claim 39, further comprising a modem coupling the processor to the transmission media channel.

43. (original) The system of claim 39, wherein the processor forms part of a communications system.

44. (original) The system of claim 39, wherein the processor forms part of a modem.

45. (original) The system of claim 39, further comprising a hybrid coupling the processor to the transmission media channel.

46. (cancelled)

47. (previously presented) The method of claim 39, wherein the estimate of the impulse response of the channel is computed in a hardware implementation.

48. (previously presented) The method of claim 39, wherein the estimate of the impulse response of the channel is computed in a software implementation.

49. (previously presented) The system of claim 39, wherein the processor is adapted to use the estimate of the impulse response of the channel to remove impairments imposed by the transmission media channel on received signals.

50. (previously presented) The system of claim 39, further comprising a filter adapted to remove channel impairments from signals received from the channel using the estimate of the impulse response of the channel.

51. (previously presented) The system of claim 50, wherein the filter comprises an echo canceller for removing echo signals.

52. (previously presented) The system of claim 50, wherein the filter comprises an equalizer whose output is equalized for gain and phase.